

## Mechanizing Site Preparation -- Spot Scarification

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*Because so many areas are targeted for planting, mechanizing the site preparation operation can achieve more efficient, faster reforestation. Two scarifier implements mounted on crawler-tractors proved feasible for preparing planting sites in a variety of vegetative covers. Production rates ranged from 1 ½ to 2 ½ acres per hour. Tree Planters' Notes 38(1) : 3-5 ; 1987*

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Site preparation is vital for rapid reforestation and often can mean the difference between success or failure of a plantation. Because site preparation is so important and the areas involved are often rough and obstacle-filled, the Missoula Equipment Development Center (MEDC) has been investigating ways to mechanize the site preparation process. Part of this effort involved locating site preparation implements that could be mounted on crawler-tractors.

The challenge was twofold: produce quality spots and produce them efficiently. A quality spot was defined as one that reduces vegetative competition for moisture, nutrients, and sunlight to help ensure seedling establishment and survival.

### Two Scalper Concepts Chosen

The MEDC investigated many concepts for crawler-tractor-mounted scalpers. Two proved effective in making planting spots in extensive testing. One method mounts a scalper on both the right and left side of the tractor blade; the other mounts two scalpers on the tractor's tool bar.

The blade-mounted system was developed by Lowell Birch. The MEDC used Birch's prototype to build a final version of the Birch "Quik-Tach" Scalper for testing (fig. 1).

The tool-bar-mounted scalper was designed and built at MEDC and is called the Rocky Mountain Scalper (fig. 2).

### Testing and Results

To determine the effectiveness of these implements, both were extensively tested in a variety of ground covers, ranging from pine grass and beargrass to heavy brush and moderate slash. Testing took place on the Bitterroot National Forest in Montana and the Clearwater National Forest in Idaho. Approximately 600 acres received site preparation

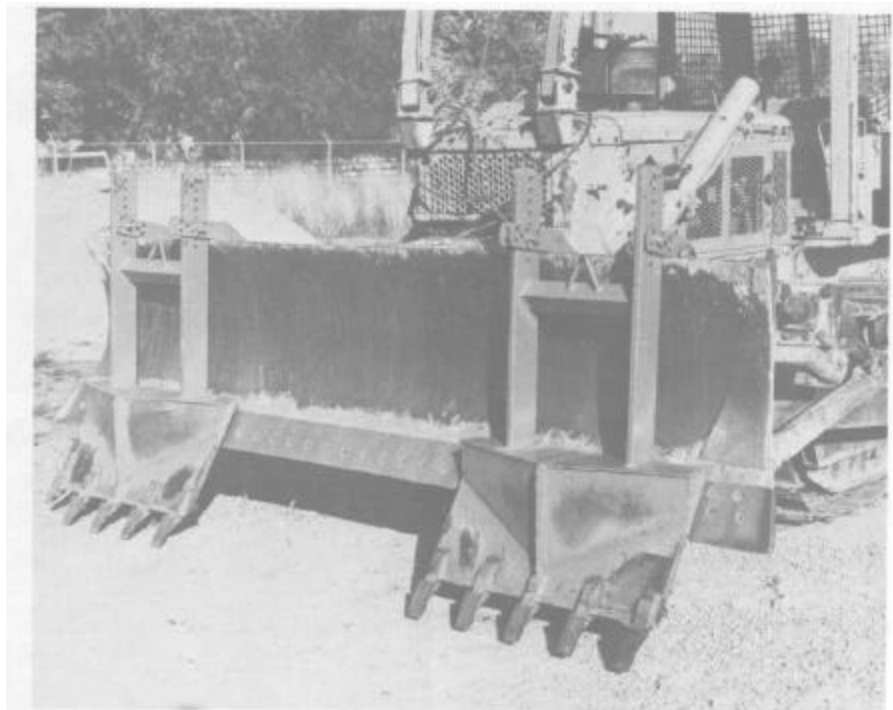


Figure 1—Birch Quik-Tach Scalper.

with these implements during testing.

Both the Birch Quik-Tach Scalper and the Rocky Mountain Scalper proved successful in preparing quality spots in the different ground cover types found at the test sites (fig. 3). Also, both prepared spots on slopes as steep as crawler-tractors can safely operate.

Both prepared about 600 planting sites per acre. Production rates for both implements ranged from 2½ acres per hour in grass cover to 11½ acres per hour in the heavy brush and moderate logging slash. The cost per acre treated ranged from \$18 to \$30, based on \$45 per hour for machine costs with operator. The recommended machine size for these implements is in the 70 to 150 horsepower range.

Based on test results and implement design, both types of scalpers have advantages and disadvantages. The Birch Quik-Tach Scalper appears to be the superior implement for most conditions and was highly praised by those testing it.

### **Birch Quik-Tach Scalper**

#### **Advantages:**

1. Each Quik-Tach Scalper implement can be attached or removed from a crawler-tractor blade in about 5 minutes.
2. Crawler-tractor requires no modification. The scalpers

can be attached directly to the blade of any leased crawler-tractor.

3. The operator has an excellent view of both scalpers.
4. Initial cost is low: \$1,500 to \$2,500 per set.
5. Good depth control for spot scarification.
6. Because most machines have tilt blades, the operator can position the blade for even scalp depth on the right and left scalpers.

7. Up to 1,500 spots per hour can be prepared.
8. Operator can easily control spot depth and length.

#### **Disadvantages:**

1. Operator must raise and lower blade to create spots.
2. Operator must be skilled at blade control to ensure quality spots.
3. Crawler tracks run over scalped sites and can compact soil on sensitive sites.



Figure 2—Rocky Mountain Scalper.

### Rocky Mountain Scalper

**Advantages:** This implement has one major advantage--it is better suited to site preparation in areas sensitive to soil compaction. Because the scalp is made behind the machine, that is, after the machine has passed over the site, the duff and litter layer is still in place to help support the crawler-tractor and minimize soil compaction before the tool-bar mounted scalpers scoop out spots. The Rocky Mountain Scalper also can prepare up to 1,500 spots per hour.

#### Disadvantages:

1. Because it is mounted at the rear, the scalper is not as visible to the operator, so scalp depth is more difficult to control.
2. The scalper must be used on a tool bar and modifications to the tool bar are necessary.
3. The winch must be removed when using the tool bar.
4. The tool bar cannot be tilted sideways to level the scalpers to the terrain.
5. A skilled operator is required to create good scalps.
6. Attaching and removing the tool bar is time consuming.
7. The operator must raise and lower the tool bar to create spots.

### Recommendations for Scalper Use

Based on our testing, the Birch Quik-Tach Scalper is recommended, unless the area to be treated is extremely sensitive to soil compaction. In sensitive areas, the Rocky Mountain Scalper may be a better choice.

Plans are available from MEDC for building these scalpers. Request drawing MEDC-751 for the Birch Quik-Tach Scalper and

drawing MEDC-686 for the Rocky Mountain Scalper. Fabrication costs for both implements range from \$1,500 to \$2,500. The tool bar for the Rocky Mountain Scalper can cost up to \$10,000.

For further information on these implements, write or call the Missoula Equipment Development Center, Building 1, Fort Missoula, Missoula, MT 59801; (406) 329-3958 or FTS 585-3958.



Figure 3—Typical spot prepared by crawler-tractor-mounted scalper, measuring 3 feet by 3 feet.